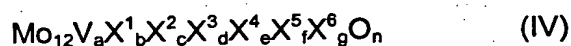


We claim:

1. A process for partially oxidizing acrolein to acrylic acid in the gas phase under heterogeneous catalysis by conducting a starting reaction gas mixture which comprises acrolein, molecular oxygen and at least one inert gas containing at least 20% by volume of molecular nitrogen and contains the molecular oxygen and the acrolein in a molar  $O_2:C_3H_4O$  ratio of  $\geq 0.5$  in one reaction stage over a fixed catalyst bed which is arranged in two spatially successive reaction zones A,B, the temperature of reaction zone A being a temperature in the range from 230 to 320°C and the temperature of reaction zone B likewise being a temperature in the range from 230 to 320°C, whose active composition is at least one multimetal oxide comprising the elements Mo and V, in such a way that reaction zone A extends to an acrolein conversion of from 45 to 85 mol% and, on single pass of the starting reaction gas mixture through the overall fixed catalyst bed, the acrolein conversion is  $\geq 90$  mol% and the selectivity of acrylic acid formation, based on acrolein converted, is  $\geq 90$  mol%, the chronological sequence in which the starting reaction gas mixture flows through the reaction zones corresponding to the alphabetic sequence of the reaction zones, wherein
  - a) the hourly space velocity of the acrolein contained in the starting reaction gas mixture on the fixed catalyst bed is  $\leq 145$  l (STP) of acrolein/l of fixed catalyst bed·h and  $\geq 70$  l (STP) of acrolein/l of fixed catalyst bed·h,
  - b) the volume-specific activity of the fixed catalyst bed is either constant or increases at least once in the flow direction of the reaction gas mixture over the fixed catalyst bed, and
  - c) the difference  $T^{\max A} - T^{\max B}$ , formed from the highest temperature  $T^{\max A}$  which the reaction gas mixture has within the reaction zone A and the highest temperature  $T^{\max B}$  which the reaction gas mixture has within reaction zone B, is  $\geq 0^\circ\text{C}$ .
2. A process as claimed in claim 1, wherein the difference  $T^{\max A} - T^{\max B}$  is  $\geq 0^\circ\text{C}$  and  $\leq 75^\circ\text{C}$ .
3. A process as claimed in claim 1, wherein the difference  $T^{\max A} - T^{\max B}$  is  $\geq 3^\circ\text{C}$  and  $\leq 60^\circ\text{C}$ .
4. A process as claimed in claim 1, wherein the difference  $T^{\max A} - T^{\max B}$  is  $\geq 5^\circ\text{C}$  and  $\leq 40^\circ\text{C}$ .

5. A process as claimed in any of claims 1 to 4, wherein the hourly space velocity of the acrolein contained in the starting reaction gas mixture on the fixed catalyst bed is  $\geq 70$  l (STP) of acrolein/l·h and  $\leq 140$  l (STP) of acrolein/l·h.
- 5 6. A process as claimed in any of claims 1 to 4, wherein the hourly space velocity of the acrolein contained in the starting reaction gas mixture on the fixed catalyst bed is  $\geq 80$  l (STP) of acrolein/l·h and  $\leq 130$  l (STP) of acrolein/l·h.
- 10 7. A process as claimed in any of claims 1 to 5, wherein the active composition of the fixed catalyst bed is at least one multimetal oxide active composition of the general formula IV



15 where the variables are defined as follows:

- $\text{X}^1$  = W, Nb, Ta, Cr and/or Ce,  
 $\text{X}^2$  = Cu, Ni, Co, Fe, Mn and/or Zn,  
 $\text{X}^3$  = Sb and/or Bi,  
 20  $\text{X}^4$  = one or more alkali metals,  
 $\text{X}^5$  = one or more alkaline earth metals,  
 $\text{X}^6$  = Si, Al, Ti and/or Zr,

- $a$  = from 1 to 6,  
 25  $b$  = from 0.2 to 4,  
 $c$  = from 0.5 to 18,  
 $d$  = from 0 to 40,  
 $e$  = from 0 to 2,  
 $f$  = from 0 to 4,  
 30  $g$  = from 0 to 40, and  
 $n$  = a number which is determined by the valency and frequency of the elements other than oxygen in IV.

8. A process as claimed in any of claims 1 to 7, wherein the volume-specific activity of the fixed catalyst bed increases at least once in the flow direction of the reaction gas mixture over the fixed catalyst bed.
- 35